Raspberry Pi-Text Recognition Robot

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Abstract

Computer Vision is one of the most valuable features of robotics. A command droid Robot is a robot which can follow the given instruction using computer vision and the microcontroller. It is designed to run automatically and track the provided instruction e.g., Left, Right, Go and Stop. The robot uses a Camera, microcontroller (RASPBERRY PI), and Artificial Intelligence (COMPUTER VISION) to identify the instruction as well as follow the instruction. The robot is driven by DC motors and cameras and is used to read the instructions. The raspberry-pi interface is utilized to perform the implementation of code/algorithms. This project aims to implement the algorithm using a microcontroller and camera to get the command droid robot deliverables. Command droid robot includes the computer vision technology and computer vision has a lot of application at industrial level e.g., face reorganization system, image processing as well as in robotics.

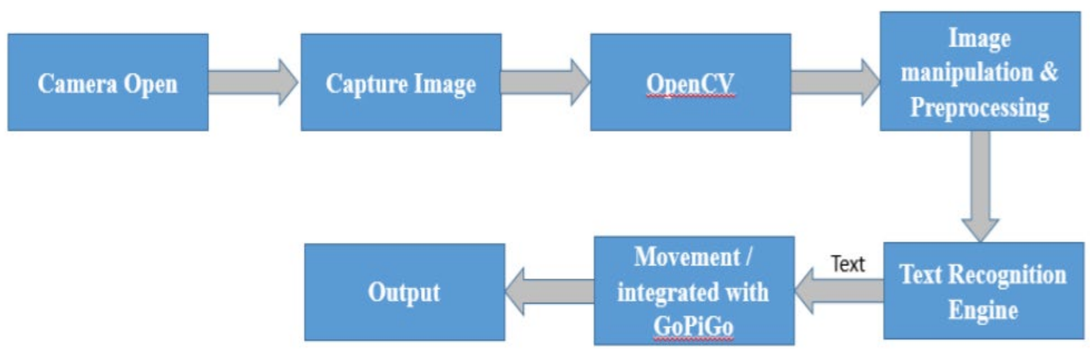
Introduction

A few years back, the establishment of the hardware and software image processing systems was mainly restricted to the development of the end-user interface, which most of the experts of each department were appointed in. The situation has been naturally changed with the arrival of the Windows operating system when most of the developers diverted to solving the issues of image processing itself. However, this has not yet led to the basic progress in solving common tasks of recognizing faces, road signs, car numbers, analyzing remote and medical pictures, etc. one of these eternal problems is clarified by trial and error by the attempts of numerous groups of the scientists and engineers. Command Droid is an Artificial intelligence-based robot which detect/reorganized the instruction in a form of text and then follow the instruction using computer vision technology and microcontroller (Raspberry pi).

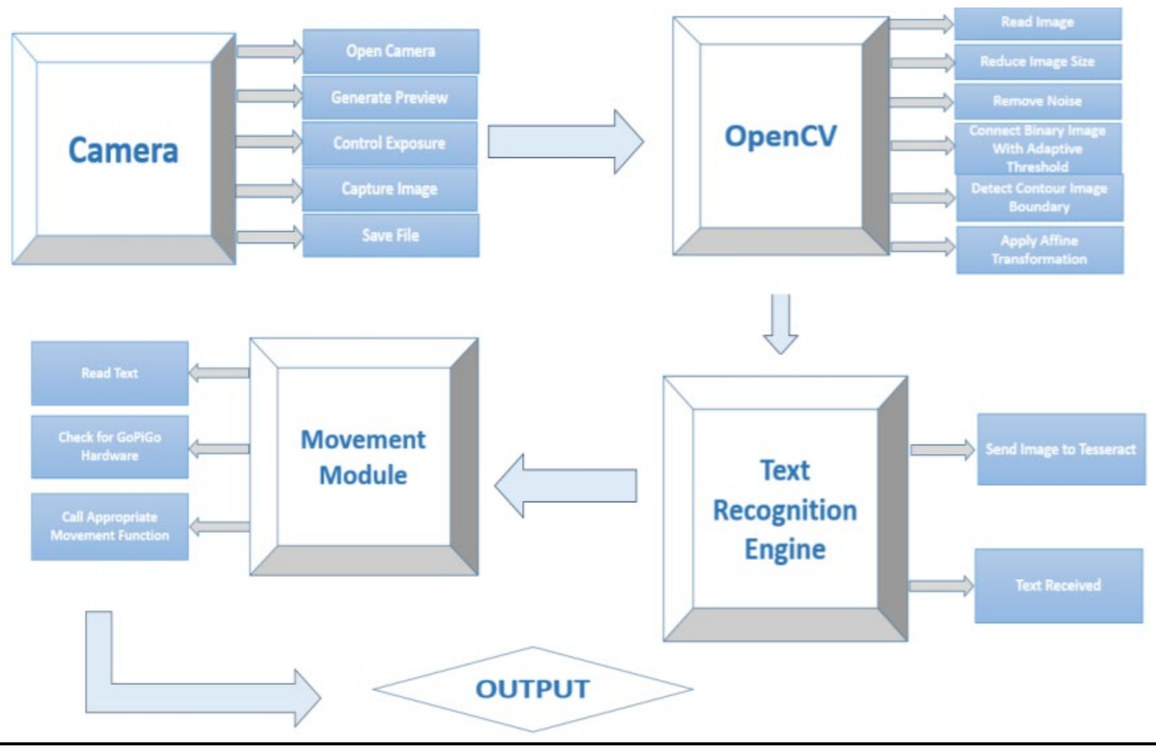
Methodology

• In the beginning we used the camera to generate the preview and control the exposure after that we capture the image and save the file.
• In the second step, we used the OpenCV software to read the image and also reduce the size and noise of the image. After that, we connect the binary image with the adaptive threshold and detect the contour boundary of the image. After detecting the image boundary, we apply the affine transformation to it
• In the third step, we used the Text reorganization engine and send the image to Tesseract to receive the text.
• In the last step we use the Movement module to recognize the text or instruction that the robot must have to follow e.g. (Left, Right, Stop, Go) and the after the reorganization of text we check for the GoPiGo hardware and call the appropriate functions to get the desired output.

Block Diagram



Algorithm Flow Chart



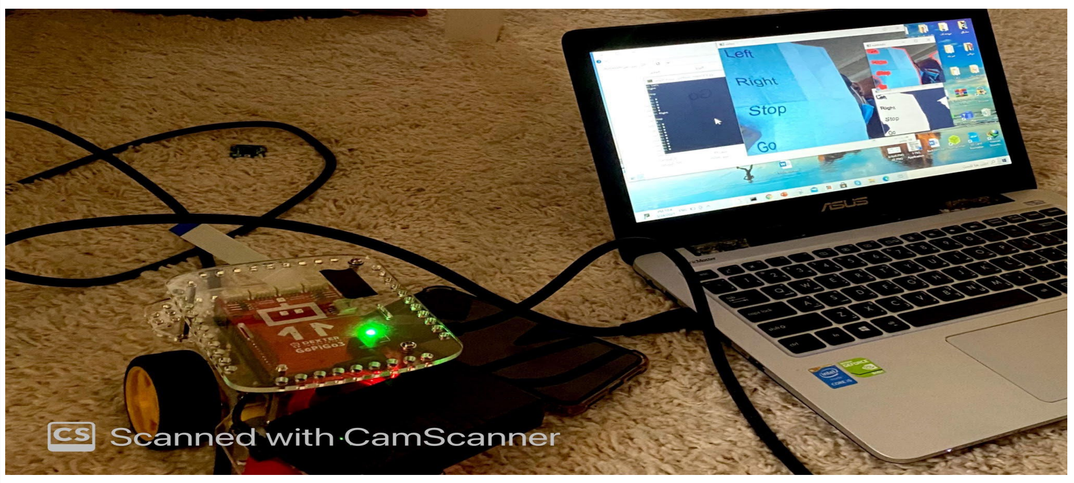
Results

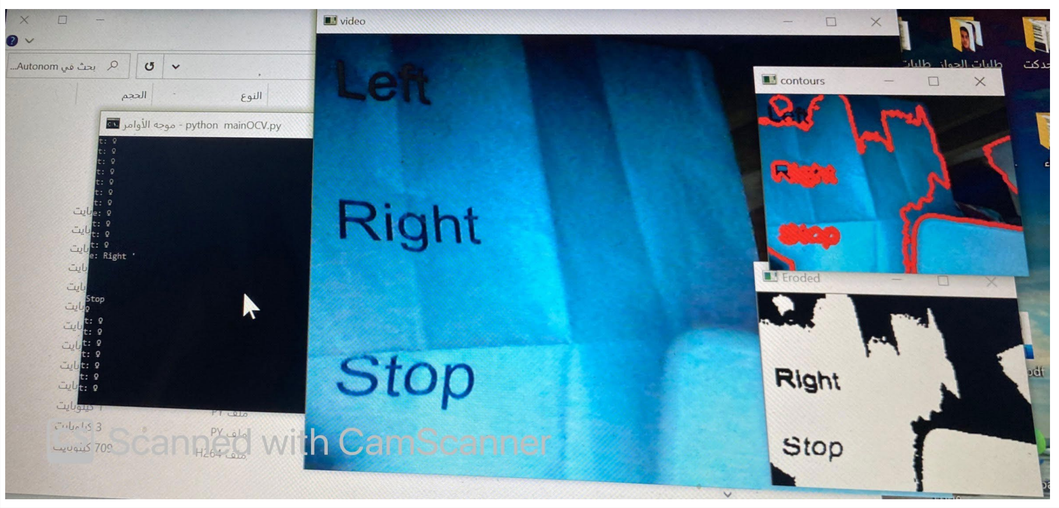
Camera :
• In this section picture is taken by camera which are given below:

OpenCV:
• In this section we remove the noise from the picture, control the exposure, convert picture into binary image, detect counter image boundary and at the end apply the affine transformation.

Tesseract Engine:
• In this section we recognized the instruction/Text, and its result are given below:

```
text Recoginise CERT
RIGHT
GO gToP
Q
```





Hardware list

(1)GoPiGo3 Board	(2) Wheels
(2) Hardware Pack	(2) motors and cables
(1)Battery pack and Cable	(2) motor brackets
(1) Caster wheel	(1) Acrylic body set
(1) Velcro strap	(1) Screw driver

CONCLUSION

In short, this project presents a computer vision-based autonomous robot which lies in a field like Artificial intelligence and image processing that deals with the processing of image from the present system. In this project, we gain a lot of skills and knowledge about computer vision technology. computer vision needs a mixture of low-level image processing to improve the picture condition e.g. (eliminate noise, control exposure) also high-level model reorganization, including image knowledge to identify the feature already in the picture